HIGH-PRESSURE PROCESSING (HPP) | DoD CFD

PURPOSE:

High Pressure Processing is a novel food processing method that uses pressure to provide safe, minimally processed foods with superior appearance, taste, texture, and nutritional value as compared to traditional heat processed foods. HPP is particularly applicable to the development of extended shelf life dairy, fruit, and vegetable items. Advances in this novel processing technology have generated high quality shelf stable potatoes, eggs, fish and whole muscle meats.

WHY IS IT NEEDED?

The majority of current operational ration components are subjected to thermal heat degradation, which adversely impacts quality, organoleptic value (sensory attributes) and nutritional status. HPP technology optimizes the quality and variety of foods contained in combat rations, subsequently enhancing Warfighter acceptance of ration components while boosting nutritional intake and morale.

TECHNOLOGY:

High pressures are applied to the food, with or without the addition of heat, to achieve inactivation of microbes and spores while minimizing chemical changes that severely affect the food's quality. There is a growing list of commercially available high pressure processed foods. For the most part, these are extended shelf-life pasteurized products that require refrigeration. Acidified foods (fruit) under these same pasteurization pressures have demonstrated maintained food quality in long term storage studies at room temperature. Current research efforts are centered on HPP sterilization of low acid foods, such as mashed potatoes. This process is better known as Pressure Assisted Thermal Sterilization (PATS), where the product is preheated to a bench mark temperature and then processed at a very high pressure. This application of pressure further elevates to product temperature above a sterilization objective of 121°C. This temperature is maintained throughout the pressure process, but returns to preheat temperature immediately with pressure release. As a result, resistant spores are inactivated and thermal degradation is tremendously reduced. The quality of these HPP foods in all noted aspects is far superior to traditional retorted foods, where products are subjected to high heat for an extended period of time and taste, texture, nutrition and color of the food is greatly compromised. Ongoing research is also focused on modeling the process variables (time, temperature and pressure) as they relate to the inactivation of bacterial spores. This will aid in the development of specific spore inactivation processing parameters for safe and effective high pressure processes for various shelf stable foods.

The CFD led a Dual Use Science and Technology (DUST) Consortium for the high pressure processing of low acid foods with significant industrial cost sharing and involvement. CFD partnerships with Avure, General Mills, Masterfoods, ConAgra, Hormel, Unilever, Basic American Foods and the National Center for Food Safety and Technology will pave the way for a new line of shelf stable products as well as technical expertise in high pressure as a sterilization method. This consortium's demonstration site is located at the National Center for Food Safety and Technology at the Illinois Institute of Technology in Chicago where production and microbial testing are conducted. DUST filing for regulatory approval of High Pressure Sterilized (HPS) mashed potatoes in an MRE™ pouch was accepted by the FDA in February 2009.

KEY FEATURES/BENEFITS:

- Increased quality, variety, acceptance and consumption of military rations
- Enhanced Warfighter morale and nutrition
- Dual Use S&T program provided significant cost sharing

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